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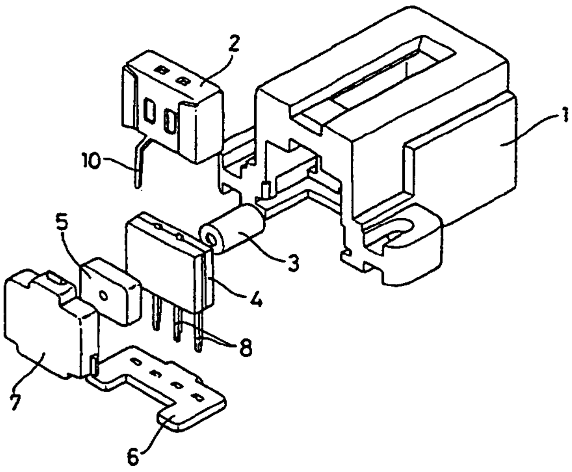
(54) Optical module.

(57) An optical module has a connector housing and a photoelectric transfer unit received in the connector housing and having a lead frame, and a photoelectric transfer element and an IC element for signal processing which are mounted on the lead frame. These elements are sealed in a transparent resin molding. The photoelectric transfer unit has six side faces and has lead terminals protruding from one of the six sides. All sides of the unit except the side from which the lead terminals protrude are covered with a metal shield case formed with a hole as a light path leading to the phtoelectric transfer element.

FIG. 1



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This invention relates to an optical module for receiving light comprising a photoelectric transfer unit (hereinafter referred to as "photounit") packaged in a transparent resin molding and assembled in a connector housing, and more specifically an optical module which can shield the photounit against electromagnetic waves with a simple arrangement.

Japanese Patent Publication 62-44828 and Japanese Utility Model Unexamined Publication 61-24705 teach means for protecting the photounit in a connector housing against electromagnetic waves.

In the former publication, a shield material having shielding properties against electromagnetic waves such as conductive layer film is laminated to the photounit covered with a transparent resin and the shield material layer is connected to a grounding pin of the photounit. Then the shield material layer is covered with an opaque resin layer.

In the latter publication, a metallized layer is formed on one side of a ceramic circuit board and a seal ring is secured to its edge. A metal shell is secured to the seal ring to seal the elements mounted on the board. The photounit thus made is put in a receptacle made of a conductive material so that the seal ring touches the receptacle. The shield against electromagnetic waves is provided by keeping the three members, the seal ring, the shell and the receptacle, at an AC grounding potential.

The technique disclosed in Japanese Patent Publication 62-44828 involves complicated manufacturing steps and thus is costly because transparent resin, shield material and opaque resin have to be laminated one on another.

The module disclosed in Japanese Utility Model Publication 61-24705, which uses a ceramic board, a seal ring, a metal shell and a conductive receptacle, is reliable. But the manufacturing steps are even more complicated than the former module and its material cost is too high to be acceptable.

It is an object of the present invention to provide an optical module which provides excellent shielding effect against electromagnetic waves with simple and inexpensive arrangements.

According to this invention, in order to solve these problems, a metal shield case is used to cover all sides of the photounit except the side from which lead terminals protrude.

The photounit comprises a lead frame, and a photoelectric transfer element and an IC element for signal processing which are mounted on the lead frame. The elements are sealed in a transparent resin molding. The shield case is formed with holes as light paths leading to the photoelectric transfer element and is provided with a grounding terminal which is connected to a grounding circuit at the outside of a connector housing carrying the photounit.

Simply by covering the photounit with the separately formed shield case, the photounit can be shielded from the surroundings. Such a module can be manufactured easily with a minimum number of assembling steps.

The light passage holes formed in the shield case may be of size barely enough not to prevent the light path. Thus, electromagnetic waves scarcely pass therethrough. This assures high shielding properties against electromagnetic waves.

The optical module according to the present invention can be assembled easily and inexpensively merely by covering the photounit with the metal shield case. Still, it reveals an excellent electromagnetic shieldability and noise resistance. Thus its reliability is high and it can be used in a noisy environment. For example, it can be used as a communication medium for factory automation machines and an optical LAN used in a power plant, a substation or an ironworks or as a communication medium for an on-board high-speed communication circuit.

Other features and objects of the present invention will become apparent from the following description taken with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of the embodiment; and

Fig. 2 is a perspective view of the shield case and the photounit showing their fronts.

In Fig. 1, the optical module comprises a connector housing 1, a shield case 2 formed by punching and bending a metal sheet, a relay fiber 3, a photounit 4, a rubber pad 5, a support base 6 for the photounit 4, and a press cap 7.

This optical module is assembled by pushing the relay fiber 3 into a guide hole formed in the connector housing 1, fitting the shield case 2 on the photounit 4, inserting the support base 6 with the photounit 4 into opposite grooves formed in the connector housing 1, and finally mounting the press cap 7 with the rubber pad 5 pressed against the back of the photounit 4. In this state, the photounit 4, on which is fitted the shield case 2, is held in a fixed position, pressed by the cap 7 through the rubber pad 5.

The photounit 4 carries on its lead frame photoelectric transfer elements (a light emitting element and/or a light receptor element) and an IC element for signal processing having a rectifying circuit and an amplifying circuit. These components are sealed in a transparent resin molding. The photounit shown incorporates both light emitting and light receptor elements and thus has four lead terminals 8, which extend through holes formed in the support base 6 and protrude out of the connector housing 1.

On the other hand, the shield case 2 has a hole 9 as a light path leading to the photoelectric transfer elements and a grounding terminal 10. All five sides of the photounit 4 except the side through which the lead terminals protrude are covered by the shield case 2. The grounding terminal 10 protrudes from the connector housing 1 in the same manner as the terminals 8 and is connected to a grounding circuit on a circuit board (not shown) carrying the connector housing 1.

Claims

1. An optical module comprising a connector housing and a photoelectric transfer unit assembled in said connector housing and having a lead frame, and a photoelectric transfer element and an IC element for signal processing which are mounted on said lead frame, said elements being sealed in a transparent resin molding, said photoelectric transfer unit having six sides and having lead terminals protruding from one of said six sides, and a metal shield case having a grounding terminal and formed with a hole as a light path leading to said photoelectric transfer element for covering all sides except the side from which said lead terminals protrude.

FIG. 1

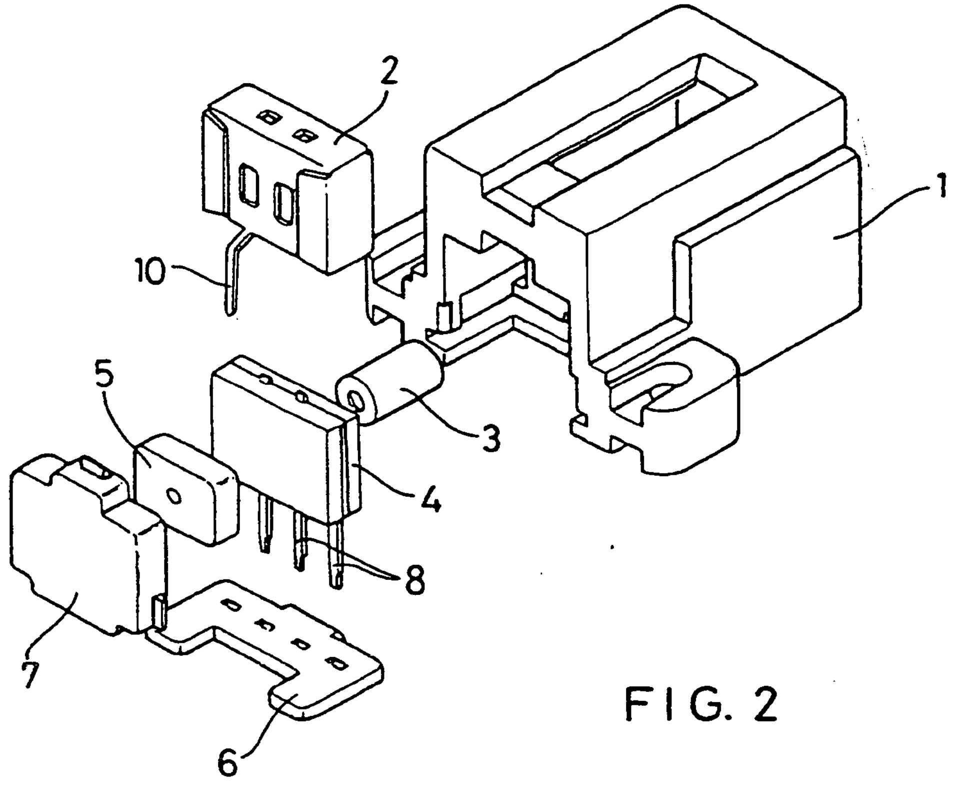
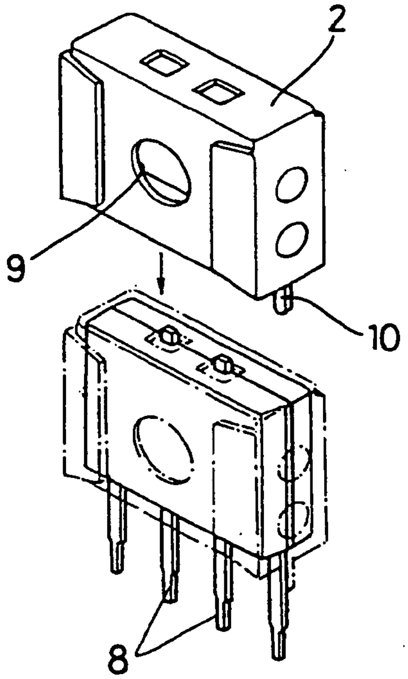


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 9207

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	40TH ELECTRONIC COMPONENTS & TECHNOLOGY CONFERENCE 20 May 1990, LAS VEGAS, US pages 218 - 221 ACARLAR ET AL. 'PHYSICAL DESIGN OT THE ODL-250H MILITARIZED SURFACE MOUNT OPTICAL DATA LINK' * page 219, left column, line 4 - page 220, left column, line 30 * ---	1	H01L31/0203 H01L33/00 G02B6/42 H01L25/16
A	PATENT ABSTRACTS OF JAPAN vol. 10, no. 201 (E-419)(2257) 15 July 1986 & JP-A-61 42 975 (S M K K. K.) 1 March 1986 * abstract * ---	1	
A	PATENT ABSTRACTS OF JAPAN vol. 14, no. 296 (P-1067)26 June 1990 & JP-A-20 93 413 (HITACHI LTD) 4 April 1990 * abstract * ---	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	PATENT ABSTRACTS OF JAPAN vol. 14, no. 468 (P-1115)12 October 1990 & JP-A-21 86 309 (NIPPON EE M P KK) 20 July 1990 * abstract * -----	1	H01L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05 OCTOBER 1992	LINA F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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